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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/667,576	09/22/2000	Tetsufumi Tsuzaki	50212-132	7978

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EXAMINER	
CUNNINGHAM, STEPHEN C	
ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 12/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/667,576	TSUZAKI ET AL.
	Examiner	Art Unit
	Stephen C. Cunningham	3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *16*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

Claims 12 and 25 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Applicant claims in parent claims 2 and 14 that the filter function satisfies the equation $L \approx a(\lambda - \lambda c) + b$, which is capable of describing any substantial linear function. Specifying that λc is within the specified wavelength band does not limit the scope of the claim. The equation is still capable of describing any possible substantially linear function.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 14, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, line 13, refers to "each optical pumping light". This is indefinite because there is only a single pump source claimed.

Regarding claim 14, lines 7 and 8, refer to "guiding the multiplexed signal light components" it is unclear whether components refers to the each signal light channel or is a typo referring to apparatus components. For examination the claim will be interpreted as referring to multiplexed signal light channels.

Claim 25 recites the limitation "λc of the optical filter" in line 1. There is insufficient antecedent basis for this limitation in the claim.

λc is not introduced in parent claim 14. For the purposes of examination, Examiner will consider claim 25 as dependent from claim 15.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1-3, 5, 6, 9, 12, 14-16, 18, 19, 22, 28, 25, 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Onaka et al. Patent Number (6,359,726) (hereafter "Onaka '726).

With respect to claims 1, Onaka '726 teaches an optical amplifier and the method inherent in the apparatus comprising:

one or a plurality of optical amplification sections each which has an optical waveguide doped with a fluorescent material;

an optical pumping light source;

an optical filter capable of changing a gradient dL/dλ of loss L dB with respect to a wavelength λ nm in a predetermined wavelength band in response to a change in the gain wavelength dependence n the amplification section(s); and

control means for controlling the optical pump source(s) sso as to keep the total power of light output from the amplifier at a predetermined level and controlling the gradient dL/dλ of said optical filter to flatten the wavelength dependence of the light output from the amplifier.

See, for example, figures 6; 8; 11; 14; 16; abstract, column 1, lines 45-53, and column 5, lines 5-20. The various control units, including AGC controllers; ALC; and VGEQ controller, are collectively considered to be control means.

With respect to claim 14, Onaka '726 teaches an optical amplification method inherent in the apparatus comprising:

guiding the multiplexed signal light to an optical waveguide doped with a fluorescent material together with predetermined optical pumping light;

guiding the multiplexed signal light to a filter capable of changing a gradient dL/dλ (loss with respect to wavelength) in a predetermined band and controlling the gradient of the optical filter so as to flatten the wavelength dependence of light power; and

an intensity of the optical pumping light to keep the total power of multiplexed signal light obtained by the amplifier at a predetermined level.

See, for example, figures 6; 8; 11; 14; 16; abstract, and column 1, lines 45-53. The various control units, including AGC controllers; ALC; and VGEQ controller, are collectively considered to be control means.

With respect to claims 2, 12, 15, and 25, it is inherent that the filter of Onaka '726 must satisfy $L \approx a(\lambda - \lambda c) + b$ because the filter has a substantially linier loss spectrum. It is noted that any substantially linier line may be satisfied by the equation $L \approx a(\lambda - \lambda c) + b$.

With respect to claims 3 and 16, Onaka '726 teaches an optical amplifier, and the method inherent in the apparatus, comprising a gain equalizer. See, for example, figures 2 and 8.

With respect to claims 5 and 18, Onaka '726 teach an optical amplifier and the method inherent in the apparatus comprising input light power detection means and control means that adjust the gradient $dL/d\lambda$ of the optical filter based on the results of the light detection means. See for example figure 2, elements 13 a and b, and column 3, lines 52-64.

With respect to claims 6 and 19, Onaka '726 teach an optical amplifier and the method inherent in the apparatus that controls the output of the amplifier, inherently controlling the gain. The control means further adjusts the gradient of the optical filter. See, for example, figure 2; and column 3, lines 45-64.

Regarding claims 9 and 22, Onaka '726 teaches an apparatus comprising ASE level detection means that detect ASE light levels at each wavelength outside the two ends of the predetermined signal band, and the control means adjusts the filter gradient so that the level difference between ASE light levels become constant. See, for example, figures 9-11 and column 16, lines 3-44.

With respect to claims 28 and 30, Onaka '726 teach that the optical amplifier comprises one of an erbium doped fiber amplifier, a Raman amplifier, and a

semiconductor optical amplifier. See, for example, figure 14, which teaches a band from 1535-1561 nm (26nm bandwidth).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onaka '726 in view of Feulner et al. (US 6,366,393) (hereafter "Feulner").

With respect to claims 4 and 17, Onaka '726 fails to teach a wave number monitor. Such is well known in the art, an example is Feulner which teaches an optical amplifier and the method inherent in the apparatus comprising a wave number monitor detecting the number of signal light components contained in the multiplexed signal, and where the control adjusts the amplifier accordingly. See figure 6, and column 9, lines 28-49. It would have been obvious to modify the apparatus of Onaka '326 by including in the control means a channel counter in order to maintain the per channel gain at a constant level when the number of signal channels change.

Claims 7, 8, 10, 11, 20, 21, 23, and 24, are rejected under 35 U.S.C. 103(a) as being unpatentable over Onaka '726 in view of Onaka et al. (US 5,894,362) (hereafter "Onaka '362").

Regarding claims 7 and 20, Onaka '726 fails to teach an apparatus which monitors each wavelength and power of signal light contained in the light output. Onaka

'362 teaches a photodetector array which monitors the power of each channel. It would have been obvious to modify the apparatus by detecting the power of each signal light in order to detect the true signal power. See, for example, figures 2; 8; and column 8, lines 54-64. Onaka '362 utilizes detected channel powers, including the shortest and longest channels, to determine the gain slope.

With respect to claims 8, 11, 21, and 24, Onaka '362 teaches an optical amplifier and the method inherent in the apparatus comprising read means for reading information related to the shortest and longest wavelengths of the signal light component and determines the power deviation on the basis of the information obtained by the read means. See, for example, column 10, lines 3-39. It would have been obvious to further modify the apparatus of Onaka '726 by supplying read in order determine the gain slope of the optical amplifier.

Regarding claims 10 and 23, Onaka '726 teaches an apparatus comprising ASE level detection means that detect ASE light levels at each wavelength outside the two ends of the predetermined signal band, and the control means adjusts the filter gradient so that the level difference between ASE light levels become constant. See, for example, figures 9-11 and column 16, lines 3-44.

Onaka '726 fails to teach an apparatus which monitors each wavelength and power of signal light contained in the light output. Onaka '362 teaches a photodetector array which monitors the power of each channel. It would have been obvious to modify the apparatus by detecting the power of each signal light in order to detect the true signal power. See, for example, figures 2; 8; and column 8, lines 54-64. Onaka '362

utilizes detected channel powers, including the shortest and longest channels, to determine the gain slope.

Claims 12 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onaka '726 in view of Clapp et al.

Clapp et al. describes the balance point (λc), in the predetermined wavelength band, used to control the tilt of an optical attenuator. It would have been obvious to modify the filter as taught by Onaka et al. to be controlled by setting a balance point in the predetermined band thus providing a simple gradient control scheme.

Claims 13 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onaka '726 view of Inoue et al. article published August 1991.

Onaka '726 teaches a dynamic optical filter, but fails to teach a specific filter design. Inoue et al. teach a optical filter that comprises:

a main optical path divided into 6 regions;

a first sub-optical path coupled to the main path in a first and third regions;

a second sub-optical path coupled to the main path in a fourth and sixth region;

a first temperature adjusting device arranged in at least one of the second region of the main optical path and the corresponding region of the first sub-optical path; and

a second temperature adjusting device arranged in at least one of the fifth region of the main optical path and the corresponding region of the second sub-optical path. See figure 3.

It would have been obvious to modify the apparatus of Onaka et al. by substituting the tunable gain equalization filter of Inoue et al. for the generic gain

equalization filter of Onaka et al. in order to reduce the accumulated tilt in a series of optical amplifiers.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onaka et al.

With respect to claim 26, Onaka et al teach an amplifier comprising a dynamic gain-flattening filter. It would have been obvious to calculate flat loss spectrum that is substantially constant and independent of wavelength in order to maintain the signal spectrum in an unaltered condition for instance when the signal spectrum is flat exiting the amplifier or when the SNR is low and any additional loss with result in the channel being buried in the ASE noise.

Claims 29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onaka et al. in view of Becker et al "Erbium doped fiber amplifiers" (hereafter "Becker").

With respect to claim 29, Onaka '726 teaches an optical amplifier comprising:

one or a plurality of optical amplification sections each which has an optical waveguide doped with a fluorescent material;

an optical pumping light source;

an optical filter capable of changing a gradient $dL/d\lambda$ of loss L dB with respect to a wavelength λ nm. In a predetermined wavelength band that compensates a gradient $dL/d\lambda$ change resulting from the optical amplification section; and

control means for controlling the optical pump source and for adjusting the gradient $dL/d\lambda$ of the optical filter in response to a gradient $dL/d\lambda$ change resulting from

the amplification section such that light output from the amplifier has a target characteristic.

See, for example, figures 6; 8; 11; 14; 16; abstract, column 1, lines 45-53, and column 5, lines 5-20. The various control units, including AGC controllers; ALC; and VGEQ controller, are collectively considered to be control means.

Becker teaches flattening an optical gain spectrum using a passive gain equalizing filter, see page 291-293. It would have been obvious to modify the apparatus of Onaka '726 by including a passive gain flattening filter in order to further flatten the gain spectrum and to reduce the complexity of the dynamic filtering needed to flatten the amplifier gain spectrum.

With respect to claim 31, Onaka '726 teaches a method of amplifying comprising:

guiding the multiplexed signal light to an optical waveguide doped with a fluorescent material together with predetermined optical pumping light;

guiding at least one of the multiplexed signal light before amplification and after amplification guiding the signal(s) to a filter capable of changing a gradient $dL/d\lambda$ (loss with respect to wavelength); and

adjusting an intensity of the optical pumping light to adjust light power after amplification such that light output has a predetermined target wavelength characteristic.

See, for example, figures 6; 8; 11; 14; 16; abstract, column 1, lines 45-53, and column 5, lines 5-20. The various control units, including AGC controllers; ALC; and VGEQ controller, are collectively considered to be control means.

Becker teaches a reducing an inherent wavelength-dependent gain in the amplification using a gain equalizing filter, see page 291-293. It would have been obvious to modify the method of Onaka '726 by reducing an inherent wavelength-dependent gain in the optical amplification in order to flatten further the gain spectrum and to reduce the complexity of the dynamic filtering needed to flatten the amplifier gain spectrum.

Response to Arguments

Applicant's arguments with respect to claim 14,29, 31 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on 703-305-8233. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9326 for regular communications and 703-872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

scc

SUPERVISORY PATENT EXAMINER
GROUP 3600